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Responding to Black Markets: Role of IT and Network Structures

Research-in-Progress

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Abstract

This paper presents the unique black markets of asset pooling and leasing services, which exposes the nature and extent of industry-specific threats. We explore how firms providing such services together with their network structures that constitute the foundations of asset pooling and leasing respond to the threat of black markets. We encapsulate detecting and encountering the threat of black markets through the theoretical lens of agility, which encompasses the elements of sensing and responding (Overby et al. 2006; Roberts and Grover 2012). This novel concept of responding to threats using the agility lens has not been adequately addressed by past studies on enterprise agility. Through a case study of a global asset pooling and leasing company, we reveal the criticality of network structures, the impracticality of IT and inadequate tracking mechanisms that challenge firms in minimizing such threats.

Keywords: Black Markets, Enterprise Agility, Sensing-Responding, Network Structures, IT-Integration

Introduction

The ability to sense and respond promptly to dynamic changes in business environments is a strategic imperative for contemporary organizations (Overby et al. 2006). However, just possessing these capabilities are not adequate for achieving competitive advantage. Rather, organizations need to strongly align the sensing component with the responding component to become significantly dexterous in combating precarious and competitive conditions (Roberts and Grover 2012). Extant literature on enterprise agility has predominantly focused on sensing and responding to opportunities (Chakravarty et al. 2013; Roberts and Grover 2012) while innately ignoring its criticality in addressing threats. So, our goal is to advance the theoretical underpinnings of enterprise agility towards responding to threats.

Based on the current agility literature (Overby et al. 2006), we argue that responding to threats is significantly different from responding to opportunities. This is because firms' agile responses are on capitalizing opportunities and they relate to firm strength. Such responses are diverse ranging from not making any moves, making simple moves to making complex moves (Overby et al. 2006). Generally, not responding to opportunities could have little to no impact on the firm. So, firms may not respond initially but may choose to respond if the opportunity becomes substantially attractive or, if the firm is able to pledge more resources to it. In contrast, theoretically, responding to threats is fundamentally different such as (i) a firm cannot ignore threats, as they have negative impacts on the firm (ii) responding to threats becomes mandatory because not addressing them reflects a firms' weaknesses, thereby potentially compromising its the competitive position (iii) not responding to threats increases their (i.e. the threats') negative impacts, and (iv) significant delays in responding to threats makes it difficult to eliminate or alleviate the threats. Past studies on agility have also highlighted the positive role of IT, both internal to the firm and external to its network partners by emphasizing on electronic integration facilitating the sharing and transfer of data and information for increasing firm efficiency, productivity and revenues (Nazir and Pinsonneault 2012; Roberts and Grover 2012; Saraf et al. 2007). They have focused on demonstrating the sensing-responding capabilities of firms for seizing opportunities and optimizing firm performance (Sambamurthy et al. 2003; Saraf et al. 2007). As a result, the extent to which IT and IT-enabled value networks can help a firm in achieving agility towards threats is relatively unexplored. We are thus motivated in providing theoretically pragmatic explanations on how firms sense and respond to threats through value network structures and by integrating IT within such networks. Collectively, sensing and responding to threats provide a novel way for achieving agility in addressing risks and reducing the imminent dangers to businesses. In threat-based scenarios, a high level of agility can be indicated by a reduction in the firm's revenue losses. Therefore, the fundamental discussion of this paper is based on (i) threats that go unnoticed but have substantial impact on the firm in the long term, and (ii) how firms can leverage technology and IT-enabled value structures for addressing such threats.

In order to capture a rich view of how firms respond to threats, we base our study foundations on the threat of black markets. For example, past studies have researched threats to businesses such as the offline and online piracy of products (e.g. IT related software, music and films) (Hill 2007; Shanahan and Hyman 2010). However, those studies have primarily focused on (a) causes: For example, how IT enables digitized intellectual property to be pilfered through peer-to-peer network applications including sharing copyrighted materials or downloading unauthorized replications of original products, and consumer motivations for sharing and buying counterfeit products (b) consequences and extent, and (c) strategic responses: focusing specifically on legal issues (e.g. digitized mechanisms that protect copyrighted materials and products by disallowing unauthorized downloading and sharing of legal IP protected products), and other remedial measures such as lowering the price of legal products, offering additional incentives to consumers purchasing authorized goods, and switching to business models that are less susceptible to piracy (Hill 2007). In comparison, we apply the theoretical lens of agility for investigating how a firm and its value networks can (i) sense and respond to external business environments-related threats, which are not caused by clients that intentionally want to buy or share fake products or original goods at massive discounts, and (ii) employ IT solutions as responsive actions for combating such threats.

Research Context: Asset Pooling and Black Markets

The asset pooling and leasing business (Note: asset pooling is the shared use of high quality tangible assets such as cars, garment hangers or wooden pallets by multiple clients that hire or rent such assets)

offers an inimitable setting for studying sensing and responding to threats. This is because asset pooling and leasing companies (APLCs) are highly vulnerable to losing their leased assets due to pilferage or negligence in handling the assets within their asset lease pools. For example, a transporter may forget some quantities of wooden pallets used for hauling and transporting goods to open markets. When pooled assets leak from their lease pools to ungoverned locations such as open farmers markets or storage yards of small-scale retailers, the identity of the assets and their geographical locations, and the flow and use of the assets remain concealed from the APLC that leased the assets. We term such locations collectively as the **black markets** of pooled assets. Several industries are connected to the asset pooling and leasing business such as for example, the 'Passenger Car Rental and Hiring in Australia' or 'Pallets & other Wood Product Manufacturing in Australia'. (Note: We are informed by our case organization that accumulated losses due to asset leakages into black markets run into millions of dollars each year). Assets in such black markets then either (i) flow through an illegitimate 'black pool' where people (i.e. non-clients of APLCs) use them or (ii) re-enter the official lease pool incognito to both, APLCs and their client networks. This adversely affects the rental revenues of APLCs resulting in accumulated losses over time. Such threats are also compounded by (i) the uniqueness of the industry wherein client networks do not take adequate responsibilities for the assets because they do not own the assets but merely hire and pass them on to other clients after use (ii) difficulty in assigning a unique identifier to an individual asset. For example, millions of similar color and type of containers (e.g. plastic and metal) are used daily for storing, hauling and transporting goods (iii) high volume of assets pooled and leased (iv) the degree of difficulty in implementing technological solutions for tracking asset movements due to the rugged nature of the asset (e.g. wooden pallets) and additional costs of procuring and implementing IT solution for tracking simple low cost assets (e.g. the average price of producing a wooden pallet is about \$25), and (v) the slow and sometimes erroneous reporting of asset stocks by client networks, which makes it hard for APLCs to track asset movements and quantities in real time.

Using the theoretical lens of agility (Overby et al. 2006; Roberts and Grover 2012) we investigate how firms sense and respond to industry-specific threats. Agility addresses the changes external to the firm such as the intensity or extent of new or existing opportunities and threats. We conceptualize black markets as threats (existing or emerging) that require firms to understand how they evolve, sustain or grow. Black markets are not physically visible but have a negative impact on the firm in terms of lost rental revenues or other losses accrued due to assets leaking from the asset pool. Then, firms need to find and implement mechanisms, strategies and solutions to manage, mitigate or cull the threats. We encapsulate detecting and encountering the threat of black markets through the theoretical lens of agility that encompasses sensing and responding. In turn, we frame our conceptual understanding of sensing and responding to threats on the following streams of literature (i) agility alignment (Roberts and Grover 2012) for understanding the sensing and responding components and their impact on firm performance (ii) competitive dynamics (Chen et al. 2007; Chi et al. 2010) to comprehend the role of value network structures in achieving agility, and (iii) electronic integration (Nazir and Pinsonneault 2012) for insights into whether IT gives organizations agile capabilities for countering threats. We also reveal the impracticality of IT solutions in addressing pervasive threats in unique scenarios such as the threat of black markets in asset pooling and leasing services. Our preliminary research objectives are to investigate (1) *How do firms sense the threat of black markets through network structures?* (2) *How do firms respond to the threat of black markets through IT-enabled network structures?*

Our research seeks to extend the theoretical framework of agility in two ways. First, it will investigate and validate sensing-responding to threats instead of opportunities. Second, by introducing threats into the sense-response-performance process, it will depict reduction in revenue losses as a firm performance indicator as opposed to profitability and increase in revenues, which has been the principal performance indicator in past studies on agility. Those studies also focus on the strategic role of IT (Sambamurthy et al. 2003) while underplaying its diminutive limitations. In contrast, our study will illustrate and explain the impracticability of IT in a unique business environment. This paper is structured as follows: The next section depicts a condensed literature review followed by the section on asset lease pools. We then discuss our research methodology and preliminary findings and conclude by discussing future work, implications and study limitations.

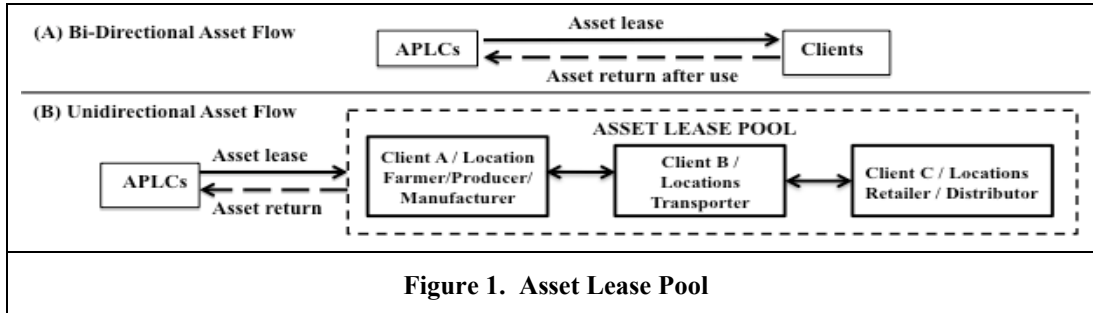
Literature Review

The concept of agility refers to the degree of alignment between two components: sensing and responding (Roberts and Grover 2012). It generally answers two questions: (1) whether a firm senses and responds to opportunities (and threats) in areas where it possesses capabilities and (2) whether it senses and responds to opportunities (and threats) beyond its existing capabilities. Theoretically when a firm is optimally agile, it signifies that it seizes opportunities through the optimal alignment of its sensing and responding capabilities (Overby et al. 2006). So, firms either develop capabilities that are useful for opportunities they can sense or for opportunities they can respond. In contrast, when firms are not optimally agile, it signifies misalignment, as (i) firms do not have responding capabilities to support the breadth of opportunities they sense or (ii) may have responding capabilities that do not correspond to the opportunities sensed. Alternatively, a firm can sense many opportunities but choose to respond only to a subset of opportunities sensed. Sensing essentially provides awareness to a firm in taking appropriate responsive actions with ease and deftness (Overby et al. 2006). Roberts et al. (2012) and Atapattu et al. (2014) conceptualized and empirically tested a firm's customer agility to firm performance. Their study advocates that a firm's customer sensing and responding capabilities when aligned significantly, impacts firm performance in terms of marketing and sales growth, profitability and market share. Overby et al. (2006) opposed measuring agility directly. Instead, they proposed measuring it as a function of a firm's sensing and responding capabilities separately and combining the individual results to derive and assess agility. Further, Overby et al. (2006) stated that agility alignment is better described by the degree of a firm's sensing and responding capabilities aligned in a continuum rather than a binary scale. This means, alignment is attained somewhere between the continuum of sensing and responding capabilities and not by merely asking whether the firm is sensing or responding to opportunities. Nadler et al. (1983) refers to alignment as "the degree to which the needs, demands, goals, objectives, and/or structures of one component" are consistent with that of the another component. Based on this, Roberts et al (2012) explain customer alignment as the degree of consistency between the structures and objectives of a firm's customer sensing and responding capabilities. Venkatraman's (1989) study on firm strategy imply that researchers should pick the most appropriate perspective of sensing and responding based on the study's research question. For example, Roberts et al. (2012) choose two perspectives viz. matching and mediation to study firm's customer sensing-responding alignment and its impact on firm performance based on data from marketing managers of firms. The matching perspective refers to the theoretical match between sensing and responding (Roberts and Grover 2012). The basic tenet of the matching perspective implies that stronger the match between a firm's sensing and responding capabilities, greater is the effect of the firm's agility on appropriate criterion variables such as firm performance (Overby et al. 2006; Roberts and Grover 2012). The mediation perspective depicts the existence of an intervening mechanism such as responsive actions between an antecedent variable and the dependent variable (Roberts and Grover 2012). The key difference between both perspectives is, the mediation view is anchored to a specific criterion variable (Venkatraman 1989) while the matching perspective depicts the theoretical match between the sense-response variables. The matching perspective offers combinations of different levels of sense and response capabilities while the mediation perspective provides insights into the sense-response-performance process (Roberts and Grover 2012). Past studies on competitive dynamics (Chi et al. 2010) have researched the use of IT in organizational networks to access network resources (e.g. product knowledge) to carry out competitive actions (e.g. promotions) that in turn exhibit better firm performance (e.g. profits) (Chi et al. 2010). Value network structures provide firms an opportunity to tap into external resources. The extent to which firms exploit such opportunities depends on their IT capabilities (Chi et al. 2010). Besides, a firm's ability to identify market-based opportunities and effectively capitalize opportunities is a pre-requisite for achieving better firm performance. Gnyawali et al. (2001) discuss the influences of cooperative networks (in which firms are embedded) on firms responding to opportunities. Such influences also increase firms' dependencies on the competencies and resources provided by external collaborative networks. Other studies have discussed advantages of dense partner networks and how such alliances increase a firm's potential to access valuable knowledge resources (Gulati 1998; Gulati et al. 2000). Dense networks having direct relationships with close-knit partners (e.g. B2B customers, suppliers and distributors) that allow information to flow fast, freely and reliably within the network (Chi et al. 2010). This helps focal firms in sensing-responding to opportunities promptly. However, focal firms responsive actions towards opportunities are mediated by the firm's capabilities, awareness and motivations (Chen et al. 2007). Our literature review reveals that past studies

have discussed agility and the importance of network structures in relation to opportunities and not threats. Our study is thus positioned on understanding how agility, theoretically, may differ when applied to addressing threats.

Asset Lease Pool

APLCs lease assets to different clients, who return the assets after use [Refer Figure 1 (A)]. However, assets also move beyond their bi-directional flow and remain in a lease pool by moving from one client to the other [Refer Figure 1 (B)]. In such uni-directional flows, assets are either (i) transferred between different locations of a client, or (ii) transferred between different clients and locations. The assets are returned to APLCs if clients have excess stock or the assets require servicing, replacing or repairing.



Network Structures in Lease Pools

Network structures are conceived as external integration that allows APLCs to connect with their network partners. These network structures potentially enable the sensing of threats by improving the capabilities of APLCs to “probe, explore and appropriate new knowledge” (Nazir and Pinsonneault 2012) on asset movement. The impact of network structures can be understood as the ability to share the knowledge between APLCs and other network partners. This provides APLCs with new information on the asset movement that they otherwise would not have obtained (Malhotra et al. 2007). The attributes of network structures are derived by understanding a network’s architecture, which is conceptualized through (a) nodes comprising the networks (b) ties connecting the nodes, and (c) patterns and relationships resulting from the connections between nodes (Ahuja et al. 2011). Therefore, network architecture is associated with the “characteristics, identities and number of nodes; location, content and strength of ties; and the patterns of interconnections among nodes (Ahuja et al. 2011). Network structures change, dissolve or modify with time (Polidoro et al. 2011). So, their evolutionary patterns are derived through basic factors that influence and shape the ties and nodes in the network (Ahuja et al. 2011). Based on the above, we characterize firm network structures in lease pools through the following elements.

Agency: This is described as a focal firm’s motivations and abilities to shape relationships and form beneficial links or discontinue unprofitable ones with network partners (Sewell 1992). In the context of our study, the network structure of clients in lease pools is brought about by APLCs that are highly motivated in creating, improving and retaining such networks for commercial gains. However, the concept of agency between nodes is rather passive because the motivation for retaining ties within network partners is only for using pooled assets rather than fulfilling financial goals.

Opportunity: This reflects the structural context of actions where network partners prefer to be linked within groups (than be left out) in order to benefit from activities that flow within the network (Ahuja et al. 2011). For example, in our study, wholesalers would prefer to be linked with transporters that not only provide pooled assets to them but also transport the wholesalers’ goods to retailers. Therefore, by linking to a value partner in the network, a wholesaler not only obtains a pooled asset but also additional services such as delivery and logistics support. Such opportunities are available to all parties in the network.

Inertia: This includes pressures for change by reflecting the “durability of structures and processes” that influence and restrict the focal firm’s actions (Ahuja et al. 2011). For example, actions or activities by network partners in lease pools to implement IT solutions can influence or restrict the actions of APLCs.

Methodology

We adopt the case study method to qualitatively capture the relative richness of our research topic within an inimitable environment in which it is observed (Yin 2009). Qualitatively studying a case is also recognized as an appropriate method for exploring phenomena in complex environments (Klein and Myers 1999) and through contemporary events (Benbasat et al. 1987). The case study method provides a more grounded approach for understanding how firms engage in responsive actions for countering risks and threats to their businesses. It also helps in exploring radical changes to existing firm capabilities (e.g. technologies) when firms respond to perceived threats. We base our case on the structured-pragmatic-situational (SPS) approach proposed by Pan et al. (2011). The SPS approach provides (i) a structured process detailing eight replicable steps for conducting case studies. These include case access negotiation, conceptualizing the phenomenon, collecting and organizing the initial data, constructing and extending the theoretical lens, confirming and validating data, selective coding, ensuring theory-data model alignment, and writing the case report (ii) pragmatic techniques that balance rigor with workability, and (iii) situational context due to techniques in handling contingencies with new data and findings.

Case Organization

Our case organization (referred hereafter as CO) is a global asset pooling and leasing company with over five decades of experience in pooling and leasing assets. It leases different types of assets (e.g. plastic reusable containers) in over 50 countries, and employs some 11,000 employees spanning more than 1,000 locations including their service centers. On a global scale the company had revenues over US\$5 billion (as on 30 June 2012). We focused on pooling assets because we were intrigued by (a) the high demand for simple yet highly robust assets such as metal and plastic containers and wooden pallets (b) the degree of difficulty in making large quantities of such assets individually identifiable (c) assets leaking from legitimate lease pools to black markets (d) challenges in tracking assets that leak from lease pools to black markets, and then re-enter the lease pool, and (e) accumulation of revenue losses due to assets re-entering the lease pool incognito to the CO, from black markets. The CO also presented an excellent setting for capturing the inherent feasibility of present-day technologies in addressing the threat of black markets.

Preliminary Findings

Based on initial interviews with senior executives of the CO, we found that sensing the threat of black markets is important to track asset leakages and take timely responsive actions. A critical attribute of sensing threats involves understanding asset movements and its vulnerability to leakages from lease pools. This involves timeliness and accuracy in sharing and communicating asset flow information within the client network structures. Responding to threats involves reacting and taking pervasive actions (collectively as a network) towards reducing the negative impacts of black markets on the business. This entails (i) reducing asset leakages (ii) recovering lost assets, and (iii) tightening information flows within the network structures. Responsive actions require tracking solutions that are practically feasible in a given business environment. To achieve this, nodes within network structures need to be ready, collaborative and closely linked to the same objectives of eliminating threats. Such network structures need to be tightly integrated through IT. (Note: Due to page limitations, limited quotes denoted by Q1,..are provided. These are added with explanations instead of tabling them).

Black Markets, Asset Leakages and Impact on Revenues (Sensing threats):

Pooled assets leak from their lease pools either through deliberate action (e.g. pilferage) or unintended behaviors in unregulated and less-governed locations collectively termed as black markets. [Q1: “We lose assets in less governed places like markets, grocery stores, which are not our accounts”]. In such situations, the CO deems the assets as lost and requisites compensation from its clients [Q2: “We don’t necessarily lose revenue if assets are lost or idling. Clients pay money for not using it (assets)”]. When assets flow into black markets, they idle or somebody picks them up and begins to use them. [Q3: “When assets are lost somebody will have that asset”]. Assets picked from black markets are used for individual purposes through a black pool where the CO has no control or knowledge of the assets although they own the assets [Q4: “We have no knowledge of where our assets are”]. In many cases, the finder of the asset also sells it to other interested parties. Alternatively, the finder returns assets from black markets to businesses that may or may not be clients of the CO. It is this scenario (refer Figure 2) that is of concern to

the CO because assets re-entering the lease pool may not provide any rental revenue to the CO if they are not reported to the CO as having come from a black market. This happens when clients also do not know the origin of the assets, as the assets are not individually identifiable (e.g. wooden pallets) [Q5: “(The) challenge is we don’t know whose assets are coming back. One-on-one correlation in a dynamic supply chain is hard to make”]. When assets re-enter the lease pool from the black market (Refer Figure 2) and flow unnoticed by the CO by remaining in active use within the lease pool, they start accruing rental revenue losses for the CO [Q6: *It (asset) may come back to the pool but without paying rent*”].

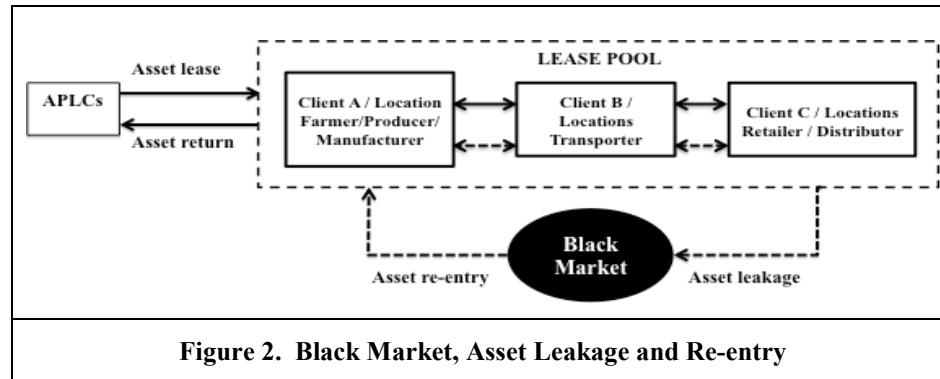


Figure 2. Black Market, Asset Leakage and Re-entry

It hard to monitor such assets re-entering the lease pool, as they are unidentifiable and flow unnoticed for an indefinite period of time [Q7: “Our asset has no unique identifiers”]. Besides, such leased assets are returned to the CO only when they are damaged, need servicing or are not required by clients [Q8: “Pallets can flow (within lease pool) without coming back to us until it is broken or needs servicing or the retailer, manufacturer has no utility for it”]. Besides, as clients have no ownership over leased assets, they do not make adequate efforts to secure or report it [Q9: “The challenge with every customer is that it is not their core product. They do not have to maintain, service, track, take care of it”; Q10: “If you change hands (i.e. pass on the assets, let us know in the system”]. This poses challenges to the CO in appropriating asset-tracking mechanisms [Q11: “We have very little tracking mechanism. Managing the assets is a problem for the company”; Q12: “Asset pool gets complicated (when) assets move from Coke to Woolworths to 7/11. We do not have any control over the assets”].

Scenario depicting revenue losses: Assets from black markets re-enter a lease pool (at some point in time in varying quantities) and end up with, for instance Client A. This happens through a transporter who may not be a client of the CO but nevertheless returns some quantities of the assets. Client A finds the assets in their premises unaware that those are from the black market. So, presuming them to be surplus stock, Client A sends those back to the CO while requesting reduction in their original contracted asset stock. In doing so, Client A ends up paying less rent although it has the same asset quantities as originally contracted. Therefore, the actual asset usage by Client A does not reduce yet Client A ends up paying less rent for their original stock in use. In this scenario the CO loses future rental revenues from Client A. The CO realizes (viz. awareness) of potential rental losses due to leaked assets re-entering the lease pool by looking at asset stock reports and future stock trends of Client A [“Q13: Our books are showing x (asset stock to Client A) and they (i.e. Client A) are paying rent. But our trend lines are showing Y volumes (i.e. Client A’s asset stock requirement), so you (Client A) must be losing pallets somewhere in the middle”]. Asset leakages, over a period of time, result in huge rental revenue losses [Q14: “Black market is a big pool in millions of dollars (of) lost revenue”].

IT Capabilities for Tracking Assets (Tracking as a responsive action to threats):

Asset tracking affirms that assets are performance worthy, safe and identifiable at locations specifically those where they are susceptible to enter potential black markets. This is generally achieved through manual paper-based mechanisms such as compiling asset stocks and reporting it manually by faxing or sending the reports by surface mail to APLCs. This apparently causes delays as well as discrepancies in information flows due to the length of time taken, inaccurate compilation of data, misplaced reports and reporting errors. In order to address those issues, APLCs have trialed various types of technologies such as barcodes and radio frequency identification (RFID) tags for facilitating asset identification and movements (Vitzthum and Konsynski 2008). However, such IT initiatives have yielded mixed results, as

the mentioned technologies have proved rather impracticable in certain types of leased assets such as plastic crates, containers and wooden pallets (Vitzthum and Konsynski 2008). As a result, tracking and preventing assets leaking into black markets is proving difficult [Q15: “*We can’t eliminate the black market but only keep it in control*”]. Tracking capabilities is a strategic responsive action in managing pooled and leased assets than merely policing black markets. Some IT initiatives taken by the CO for tracking their assets are mentioned below. Information was also extracted from industry-based reports (<http://www.ibisworld.com.au>).

Universal Product Codes (UPCs): Although UPC’s are successfully used in the retail industry (since its introduction in the 1970’s) barcodes were found to be unfeasible in identifying and tracking pooled assets. For example, barcode scanning usually requires a person to hold the item in front of a barcode scanner or point a scanner directly at the barcode in a proper reading angle within a fairly short distance (max 2 feet). Besides, the scanning can be done only one item at a time. For our CO, barcode scanning thousands of assets on a daily basis was difficult because (i) assets were mostly stacked beyond the reading distances of scanners or were hidden behind other assets such as pallets used for storing, hauling or transporting them (ii) scanning required more human resources to scan each asset at many different locations, and (iii) the amount of time spent in scanning meant longer lead-times for asset flows and reporting.

Radio Frequency Identification (RFID) tags: RFIDs resolved some issues of UPCs. For example, RFID tags could be read from up to 10 feet away without being in the line of sight. It was also possible to perform multiple tag readings with a single scan by simply walking or driving along the assets with a tag reader. However, RFIDs had several drawbacks: (i) proper readings were not possible when water or metal blocked radio waves (ii) attaching tags to certain assets (e.g. wooden pallets) was not practically feasible as glue could not properly fix the tag to the asset surfaces while placing tags inside wood or metal-based assets was not practical as it masked and interfered with radio frequency signals. A realistic solution was affixing two tags to an asset but that was deemed expensive, as clients required spending up to \$10,000 per reader portal (unit required for RFID scanning) and other RFID related infrastructure development. Although RFID had the potential to provide benefits, the CO’s clients were not willing to share financial costs. They saw no visible and immediate tangible benefits [Q16: “*They (clients in the supply-chain) don’t have the kind of maturity to absorb technology without incurring costs*”].

Ubiquitous Technologies: APLC’s like other businesses are experimenting with new dynamic technologies such as mobile apps and social media to manage their pooled assets. However, there is skepticism on whether such technologies can improve asset tracking and reduce leakages into black markets. The CO is presently trialing mobile apps but is unsure whether that will yield expected outcomes for tracking assets in real time and stop them from leaking into black markets [Q17: “*Mobile apps does not track anything. But it can help in timely reporting (and) improve the accuracy in reporting so that when there is an issue, you can zero down on the page where there is a leakage*”]. Besides, how much a firm can reduce its revenue losses by implementing mobile apps remains uncertain [Q18: “*We still haven’t got concrete numbers to say that (the threat of) black market has reduced*”].

Conclusions and Future Work

The unique context of our study explored and evidenced the relatedness of IT and IT-enabled value networks to enterprise agility specifically in responding to threats. Threats exist or emerge in any industry or business. Our study infers that unlike responding to opportunities wherein firms can exercise complacency, responding to threats is mandatory. This dictates that the alignment between sensing and responding to threats must be optimally balanced in order to be agile in addressing threats. Any imbalance can seriously affect the firm such as accumulating financial losses over time. Our findings indicate that firms may require external interventions such as the collective efforts of network partners in sensing and responding to threats. This contrasts with past studies on agility based on sensing and responding to opportunities, which is accomplished internally by the firm and its resources. Our study also highlights the impracticability of technology, which may also be the case in other types of industries resulting in low or slow responses to threats. In addition, the study provides insights on how network structures can facilitate seamless, uninterrupted and timely information flows of asset movements within network partners and APLCs. Improved sensing capabilities then enable APLCs to take appropriate responsive actions by utilizing the same networks. This is relatively unexplored by past studies on agility in management and Information Systems domains.

Our study extends the theoretical understanding of agility by focusing exclusively on (a) sensing and responding to threats (b) reducing revenue losses as a firm's performance indicator (c) the uniqueness of black markets as a potential threat, and (d) asset pooling and leasing as a novel context for framing how firms and network structures aided by IT can sense and respond to threats. Broadly, our preliminary investigation and insights suggest a theoretical mismatch between the sensing and responding capabilities of firms towards threats. While firms are highly aware and sensitive to the threat of black markets, their responsive actions are rather inadequate when dealing with such threats. Our findings evidence that firms could struggle to respond to industry-specific threats due to the unsuitability of technologies in providing adequate responsive capabilities. Therefore, IT in the context of our study is found to be unsuitable in mediating the sense-response capabilities of the firm in addressing threats. Although this reflects the importance of responding to threats in dynamic and hypercompetitive environments, more investigations are required to understand the nomological networks surrounding sensing and responding to threats. This would include precise antecedents to (i) sensing capabilities such as information flows and the role of technology in tapping supply-chain network partners, and (ii) responding capabilities such as dexterous IT solutions, integrative structures, people and processes to counter threats. Although we conceptually distinguished sensing and responding to threats, we also need to distinguish them empirically to develop nuanced understanding of how they may differentially impact firm performance. Further analysis based on in-depth case investigations can reveal whether firms place equal importance on sensing and responding to threats. Our future research will examine the mediating effects of new technologies on the sense-response capabilities of firms and its value networks.

Contributions and Implications

Based on the theoretical underpinnings of agility literature, we showed how sensing and responsive actions toward threats provides better understanding of a firm's agility towards managing threats. Understanding sensing and responding to threats is useful for examining how IT supports or fails to support either or both components (i.e. sense and response). In addition, our analysis also illustrates the symbiotic relationship between sensing and responding to threats. By juxtaposing firm sensing and responding capabilities towards threats, we highlight a new side of enterprise agility and the impracticability of IT in unique business settings. This paper exposes IS researchers to consider different perspectives of agility alignment when undertaking agility related research. Our study alerts firms towards aligning their sense-response capabilities by building or operationalizing more resources (e.g. manpower, IT) towards addressing threats. Firms may also need to assimilate many different types of capabilities to overcome the unsuitability of technology for addressing threats. This paper also expands the body of knowledge under the IS Strategy, Structure, and Organizational Impacts Track of this conference by highlighting a new perspective of sensing and responding to threats and its impact on organizations. It also shows the unsuitability of sophisticated IT and its impact on firms and value networks. Although we concur with the strategic importance of IT (Venkatraman and Zaheer 1990), we argue that the uniqueness of businesses (e.g. APLCs) and products (e.g. leased assets) makes it imperative that sensing and responding to threats be critically examined by firms when considering any IT-based solutions as strategic responsive actions. We show that the emergent capabilities of technology may not always be implementable in valuable yet unique network structures.

Limitations

The focus of this research is limited to a specific industry. So, black markets are native to that industry, limiting responsive actions that are industry-specific. Threat levels and responses can vary based on the nativity of the industry. Thus, sophisticated technology may be available as a viable solution but may not always be practically feasible to use it. Similarly, the types of technologies analyzed by our study limit the impracticability of IT only to those technologies. There could be other technologies better suited to address the threat of black markets, which needs further explorations. To generalize and homogenize our findings, we require further empirical validation (which our study will undertake in the next phase). This will entail investigating responsive actions for mitigating threats in another type of business (or industry) with the same theoretical lens of agility. Although this paper aims to make its preliminary findings generalizable to responsive actions towards threats, future work and studies may try to replicate the conceptual idea of applying the sensing-responding mechanism to different threats in other business or organizational settings.

References

- Ahuja, G., Soda, G., and Zaheer, A. 2011. "The Genesis and Dynamics of Organizational Networks," *Organization Science* (23:2), 2012/04/01, pp. 434-448.
- Atapattu, M., and Sadera, D. 2014. "Agility in Consumer Retail: Sense-Response Alignment through the Eyes of Customers," *Australasian Journal of Information Systems; Vol 18, No 2 (2014)*.
- Benbasat, I., Goldstein, D.K., and Mead, M. 1987. "The Case Research Strategy in Studies of Information Systems," *MIS Quarterly* (11:3), pp. 369-386.
- Chakravarty, A., Grewal, R., and Sambamurthy, V. 2013. "Information Technology Competencies, Organizational Agility, and Firm Performance: Enabling and Facilitating Roles," *Information Systems Research* (24:4), 2013/12/01, pp. 976-997.
- Chen, M.-J., Su, K.-H., and Tsai, W. 2007. "Competitive Tension: The Awareness-Motivation-Capability Perspective," *The Academy of Management Journal* (50:1), pp. 101-118.
- Chi, L., Ravichandran, T., and Andrevski, G. 2010. "Information Technology, Network Structure, and Competitive Action," *Information Systems Research* (21:3), Sep 2010, pp. 543-570, 655, 657.
- Gnyawali, D.R., and Ravindranath, M. 2001. "Cooperative Networks and Competitive Dynamics: A Structural Embeddedness Perspective," *Academy of Management. The Academy of Management Review* (26:3), Jul 2001, pp. 431-445.
- Gulati, R. 1998. "Alliances and Networks," *Strategic Management Journal* (19:4), pp. 293-317.
- Gulati, R., Nohria, N., and Zaheer, A. 2000. "Strategic Networks," *Strategic Management Journal* (21:3), pp. 203-215.
- Hill, C.W.L. 2007. "Digital Piracy: Causes, Consequences, and Strategic Responses," *Asia Pacific Journal of Management* (24:1), Mar 2007, pp. 9-25.
- Klein, H.K., and Myers, M.D. 1999. "A Set of Principles for Conducting and Evaluating Interpretive Field Studies in Information Systems," *MIS Quarterly* (23:1), pp. 67-93.
- Malhotra, A., Gosain, S., and El Sawy, O.A. 2007. "Leveraging Standard Electronic Business Interfaces to Enable Adaptive Supply Chain Partnerships," *Information Systems Research* (18:3), 2007/09/01, pp. 260-279.
- Nadler, D., and Tushman, M.L. (eds.). 1983. *A Diagnostic Model for Organizational Behavior*. New York: McGraw-Hill.
- Nazir, S., and Pinsonneault, A. 2012. "It and Firm Agility: An Electronic Integration Perspective," *Journal of the Association for Information Systems* (13:3), Mar 2012, pp. 150-171.
- Overby, E., Bharadwaj, A., and Sambamurthy, V. 2006. "Enterprise Agility and the Enabling Role of Information Technology," *European Journal of Information Systems* (15:2), Apr 2006, pp. 120-131.
- Pan, S.L., and Tan, B. 2011. "Demystifying Case Research: A Structured-Pragmatic-Situational (Sps) Approach to Conducting Case Studies," *Information and Organization* (21:3), pp. 161-176.
- Polidoro, F., Ahuja, G., and Mitchell, W. 2011. "When the Social Structure Overshadows Competitive Incentives: The Effects of Network Embeddedness on Joint Venture Dissolution," *Academy of Management Journal* (54:1), pp. 203-223.
- Roberts, N., and Grover, V. 2012. "Investigating Firm's Customer Agility and Firm Performance: The Importance of Aligning Sense and Respond Capabilities," *Journal of Business Research* (65:5), 5//, pp. 579-585.
- Sambamurthy, V., Bharadwaj, A., and Grover, V. 2003. "Shaping Agility through Digital Options: Reconceptualizing the Role of Information Technology in Contemporary Firms," *MIS Quarterly* (27:2), pp. 237-263.
- Saraf, N., Christoph Schlueter, L., and Gosain, S. 2007. "Is Application Capabilities and Relational Value in Interfirm Partnerships," *Information Systems Research* (18:3), Sep 2007, pp. 320-339, 363, 365.
- Sewell, W.H., Jr. 1992. "A Theory of Structure: Duality, Agency, and Transformation," *American Journal of Sociology* (98:1), pp. 1-29.
- Shanahan, K.J., and Hyman, M.R. 2010. "Motivators and Enablers of Scouring: A Study of Online Piracy in the Us and Uk," *Journal of Business Research* (63:9-10), 9//, pp. 1095-1102.
- Venkatraman, N. 1989. "The Concept of Fit in Strategy Research: Toward Verbal and Statistical Correspondence," *Academy of Management Review* (14:3), pp. 423-444.
- Venkatraman, N., and Zaheer, A. 1990. "Electronic Integration and Strategic Advantage: A Quasi-Experimental Study in the Insurance Industry," *Information Systems Research* (1:4), pp. 377-393.

- Vitzthum, S., and Konsynski, B. 2008. "Chep: The Net of Things," *Communications of the Association of Information Systems* (22:26), pp. 485-500.
- Yin, R.K. 2009. *Case Study Research: Design and Methods*, (4 ed.). California: Sage Publications Inc.